layer **70** includes three parts. One of the mask layer **70** is a center mask layer **71** corresponding to the center region **12** so that the center mask layer **71** defines the first region. Another one of the mask layer **70** is an inner periphery mask layer **72** corresponding to the inner periphery region **26***a* so that the inner periphery mask layer **72** defines the second region. The inner periphery mask layer **72** surrounds the center mask layer **71**. The last one of the mask layer **70** is an outer periphery mask layer **73** corresponding to the outer periphery region **26***b* so that the outer periphery mask layer **73** defines the third region. The outer periphery mask layer **73** surrounds the center mask layer **71** and the inner periphery mask layer **72**.

[**0052**] The inner periphery mask layer **72** has multiple openings, and a distance between the neighboring two openings is smaller than that of the center mask layer **71**. The outer periphery mask layer **73** has multiple openings, and a distance between the neighboring two openings is larger than that of the inner periphery mask layer **72**.

[**0053**] Next, as shown in **FIG. 9**, a part of the N type epitaxial layer (**25**) exposed through the openings of the mask layer **70** is anisotropically etched by a dry-etching method such as a RIE method so that a trench is formed. Thus, the N columns **25**, **25***a*, **25***b* are formed. The width of each N column **25**, **25***a*, **25***b* is controlled appropriately. Each N column **25**, **25***a*, **25***b* is separated by the trench. Then, the mask layer **70** is removed.

[**0054**] Next, as shown in **FIG. 10**, the P column **27**, **27***a*, **27***b* is embedded in the trench by an embedding epitaxial growth method. Thus, the SJ structure having the N column **25**, **25***a*, **25***b* and the P column **27**, **27***a*, **27***b* is formed. Here, the width of each trench is the same. Therefore, the P column **27**, **27***a*, **27***b* can be formed in each trench homogeneously. Thus, the difference of impurity amount between the P column and the N column is controlled appropriately and the total impurity amount of the P column and the N column is also controlled appropriately. Thus, the drift layer **26** is formed.

[**0055**] Next, the P type semiconductor layer covering the surface of the device is polished and removed if necessary. When the P type semiconductor layer is used as a body region, a part of the P type semiconductor layer is removed, i.e., the removed portion of the P type semiconductor layer is controlled appropriately.

[**0056**] Then, other parts such as electrodes and semiconductor regions can be formed by a conventional semiconductor process. Thus, the device having the drift layer **26** is completed.

Second Embodiment

[**0057**] A semiconductor device having a SJ structure according to a second embodiment of the present invention is shown in **FIG. 12**.

[**0058**] The N columns **25** and the P columns **27** in the center region **12** are repeated alternately in a horizontal direction. The N columns **25***a*, **25***b* and the P columns **27***a*, **27***b* in the inner and the outer periphery regions **26***a*, **26***b* are also repeated alternately in the same horizontal direction. The periphery region **14** includes three parts which are composed of the inner and the outer periphery regions **26***a*, **26***b* and the third periphery region **26***c*. The third periphery region **26***c* includes the N column **25***c* and the P column **27***c*, which are formed to extend from the N column **25** and the P column in the center region **12**. Thus, the width of the N column **25***c* in the third periphery region **26***c* is equal to the width of the N column **25** in the center region **12**. Further, the width of the P column **27***c* in the third periphery region **26***c* is equal to the width of the P column **27** in the center region **12**. The impurity amounts of the N column **25***c* and the P column **27***c* in the third periphery region **26***c* cannot be controlled appropriately so that the difference of the impurity amount between the N column **25***c* and the P column **27***c* in the third periphery region **26***c* is not changed compared with the center region **12**. In this case, the withstand voltage of the third periphery region **26***c* may be reduced. However, when the length of the third periphery region **26***c* is sufficiently long, the reduction of the withstand voltage of the third periphery region **26***c* is limited without using the above mentioned technique according to the first embodiment.

[**0059**] Thus, the width of the N column **25***a* in the inner periphery region **26***a* is different from that in the outer periphery region **26***b*. Specifically, the width of each N column **25***a*, **25***b* is changed in the horizontal direction only.

[**0060**] The technique according to the first embodiment is used in a region, the withstand voltage of which is reduced, so that the reduction of the total withstand voltage of the device is limited.

[**0061**] In this case, even when the impurity amount is deviated, sufficient withstand voltage of the device is obtained.

[**0062**] The device shown in **FIG. 12** can be manufactured by using a mask having multiple openings, which are aligned in line in the horizontal direction.

[**0063**] (Modifications)

[**0064**] Although the device shown in **FIG. 1** includes the body layer as the resurf layer, the device can have no resurf layer.

[**0065**] Although the device in **FIG. 1** includes ten pairs of the N column **25**, **25***a*, **25***b* and the P column **27**, **27***a*, **27***b*, the number of pairs of the N column and the P column can be other numbers.

[**0066**] Although the excess impurity amount in the inner periphery region **26***a* is changed from zero to a predetermined value with rectangular shape shown in **FIG. 3**, the excess impurity amount in the inner periphery region **26***a* can be changed stepwise.

[**0067**] Preferably, the total impurity amount of the N column **25***b* and the P column **27***b* in the outer periphery region **26***b* is equal to or smaller than the total impurity amount of the N column **25** and the P column **27** in the center region **12**. This is because the electric filed concentration at the outer periphery region **26***b* is reduced by reducing the impurity amount in the outer periphery region **26***b*.

[**0068**] Although the difference **126***a* of the impurity amount between the N column **25***a* and the P column **27***a* is controlled by the width of the N column **26***a*, the difference **126***a* can be controlled by the width of the P column **27***a*. Further, the difference **126***a* can be controlled by the impurity concentration of each column **25***a*, **27***a*.